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R—56—2017

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2017

CHEMISTRY

Paper VII

(Physical and Inorganic Chemistry)

(MCQ + Theory)

(Thursday, 30-3-2017)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—40

N.B. :— (i) Attempt all questions.

(ii) All questions carry equal marks.

(iii) Use of logarithmic table and calculator is allowed.

(iv) Use separate answer sheet (OMR sheet) for MCQ (Q. No. 1).

MCQs

1. Select the *correct* answer for each of the following multiple choice questions :

(1) According to de-Broglie's equation, the momentum of a particle in motion is proportional to wavelength.

(a) directly

(b) inversely

(c) not

(d) none of these

(2) In Schrodinger's wave equation, the symbol ψ represents the

(a) Frequency of the spherical wave

(b) Wavelength of the spherical wave

(c) Probability of finding electrons around the nucleus

(d) Amplitude of the spherical wave

(3) Entropy is a measure of of molecules of the system.

(a) Velocity

(b) Rate

(c) Randomness

(d) Concentration

P.T.O.

- (4) The efficiency of heat engine is maximum when :
- (a) Temperature of source is maximum and that of sink is minimum
 - (b) Temperature of source and sink are maximum
 - (c) Temperature of source is minimum and that of sink is maximum
 - (d) Temperature of source and sink are minimum
- (5) “No temperature change occurs when the gas is allowed to expand in vacuum without doing any external work” is statement of
- (a) Joule-Thomson effect
 - (b) Joule’s law
 - (c) Second law of thermodynamics
 - (d) Carnot’s theorem
- (6) The sulphur system has four phases; it is
- (a) One component system
 - (b) Two component system
 - (c) Three component system
 - (d) Four component system
- (7) When a single phase is present in a two component system, the degree of freedom is
- (a) Zero
 - (b) One
 - (c) Two
 - (d) Three
- (8) Which of the following pair is an example of isobar ?
- (a) ${}^7\text{N}^{15}$ and ${}^7\text{N}^{14}$
 - (b) ${}^1\text{H}^1$ and ${}^1\text{H}^2$
 - (c) ${}^8\text{O}^{16}$ and ${}^8\text{O}^{17}$
 - (d) ${}^6\text{C}^{14}$ and ${}^7\text{N}^{14}$
- (9) Which of the following is thermonuclear reaction ?
- (a) Nuclear fission
 - (b) Nuclear fusion
 - (c) Both (a) and (b)
 - (d) None of these
- (10) During ignition and incineration process, precipitate is converted into
- (a) Definite composition
 - (b) Varying composition
 - (c) Both (a) and (b)
 - (d) None of these

Theory**Section 'A'****(Physical Chemistry)**

2. Attempt any *two* of the following :
- (a) Describe the Davison and Germer experiment for the verification of wave nature of electrons.
 - (b) Discuss the application of phase rule to the Silver-Lead System.
 - (c) Derive an expression for entropy changes of an ideal gas as a function of temperature and pressure.
 - (d)
 - (i) Explain Planck's quantum theory.
 - (ii) Calculate the uncertainty in position of an electron, if the uncertainty in velocity is $5.7 \times 10^5 \text{ m s}^{-1}$ [$h = 6.626 \times 10^{-34} \text{ JS}$, Mass of electron = $9.1 \times 10^{-31} \text{ kg}$.].
3. Attempt any *two* of the following :
- (a) Discuss the need for second law of thermodynamics. Give any *three* statements of second law of thermodynamics.
 - (b)
 - (i) Derive de-Broglie's equation.
 - (ii) Draw neatly the phase diagram of Phenol-Water system.
 - (c)
 - (i) Calculate the entropy change when two moles of an ideal gas is allowed to expand isothermally at 300 K from a pressure of 20 atmosphere to a pressure of 4 atmosphere.
($R = 8.314 \text{ Jk}^{-1} \text{ mol}^{-1}$).
 - (ii) Calculate entropy change when one mole of liquid is evaporated at 315 K. The molar heat of vaporization of liquid is $33507 \text{ Jk}^{-1} \text{ mol}^{-1}$.
 - (d) What is phase rule equation ? Explain the terms involved in it with suitable examples.

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Section 'B'**(Inorganic Chemistry)**

4. Attempt any *two* of the following :
- (a) What is nuclear fission reaction ? Explain with examples.
 - (b) Give characteristics of alpha particles.
 - (c)
 - (i) Explain in brief group displacement law.
 - (ii) What is precipitation ? Explain the effect of pH on precipitation.
 - (d) Explain the following steps involved in gravimetric analysis :
 - (i) Filtration and Washing
 - (ii) Drying
 - (iii) Ignition and incineration.